15.08.2024

Curriculum at LAB University of Applied Sciences 2025-2026

Bachelor’s of Engineering, Environment and Circular Economy Solutions Engineering 25K, online studies

Code	Name	1 y	2 y	3 y	4 y	ECTS total
TLTIKTEC25KV-1057	**CORE COMPETENCE**					**135**
TLTIKTEC25KV-1054	**Common studies**					**15**
AY00BU56	Developing professional competence 1	1				1
AY00BU57	Developing professional competence 2		1			1
AY00BU58	Developing professional competence 3			1		1
A300CE13	Orientation to Sustainability Thinking	2				2
KE00BT61	English for Work	4				4
KR00BU42	Swedish for Work, Spoken		1			1
KR00BU43	Swedish for Work, Written		1			1
KS00BT59	Expert Communication Skills	4				4
TLTIKTEC25KV-1002	**Professional Core Competence**					**75**
TLTIKTEC25KV-1004	**Basics of environmental engineering**					**15**
AT00CP39	Ecosystems and Climate Change	5				5
AT00DC89	Water and energy management	5				5
AT00CP42	Chemistry in Environmental Engineering	5				5
TLTIKTEC25KV-1058	**Basic Studies in Mathematics and Physics**					**15**
AT00BT67	Basic studies in mathematics	3				3
AT00BT68	Mathematics in Technology 1	3				3
AT00BT69	Mathematics in Technology 2		3			3
AT00BT70	Basic studies in physics		3			3
AT00BY87	Physics of enviromental engineering		3			3
TLTIKTEC25KV-1006	**Material Cycles**					**15**
AT00CP41	Contaminated Soil and waste Management	5				5
AT00CP45	Technical and biological material cycles	5				5
AT00CP46	Material efficiency in business	5				5
TLTIKTEC25KV-1007	**Circular Economy Guiding Methods**					**15**
AT00CP49	Circular economy business models and product design		5			5
AT00DB60	Environmental Legislation and Administration	5				5
AT00CP44	Environmental Impact Management		5			5
TLTIKTEC25KV-1008	**Digital tools for Circular Economy**					**15**

AT00CP51	Computer Aided design and modelling	5				5
AT00CP52	GIS and digital applications		5			5
AT00CP53	Life Cycle Analyses		5			5
TLTIKTEC25KV-1021	**Practical Training**					**30**
HA00CD55	Practical Training				10	10
HA00BU60	Practical Training 2				10	10
HA00BU61	Practical Training 3				10	10
TLTIKTEC25KV-1022	**Thesis**					**15**
AO00BU62	Thesis Planning				5	5
AO00BU63	Thesis Project				5	5
AO00BU64	Thesis Report				5	5
TLTIKTEC25KV-1009	**COMPLEMENTARY COMPETENCE**					**105**
TLTIKTEC25KV-1010	**Circular Economy Applied Studies and Projects**					**15**
AT00CZ00	Applied environmental projects 1					0
AT00CZ01	Applied environmental projects 2					0
AT00CZ02	Applied environmental projects 3					0
TLTIKTEC25KV-1023	**Sustainable Solutions Engineering**					**0**
TLTIKTEC25KV-1048	**Sustainable Energy Management**					**15**
TLTIKTEC25KV-1049	**Environmental, Quality and Project Management**					**15**
TLTIKTEC25KV-1050	**Circular Economy Co-Creation Hubs**					**15**
TLTIKTEC25KV-1051	**Digital Tools for Circular Economy**					**15**
TLTIKTEC25KV-1052	**Sustainable Industrial Management**					**15**
TLTIKTEC25KV-1053	**Sustainable Sludege and Water Management**					**15**
TLTIKTEC25KV-1028	**Wood Technology**					**0**
TLTIKTEC25KV-1029	**Basic Studies in Wood Engineering**					**15**
TLTIKTEC25KV-1034	**Basics of Wood and Biotechnology**					**15**
TLTIKTEC25KV-1030	**Sawmill Industry**					**15**
TLTIKTEC25KV-1031	**Panel Products and Engineered Wood Products**					**15**
TLTIKTEC25KV-1033	**Furniture Industry**					**15**
TLTIKTEC25KV-1035	**Biomaterials and Food Technology**					**0**
TLTIKTEC25KV-1061	**Basics of Biomaterials and Food Materials**					**15**
TLTIKTEC25KV-1062	**High-quality Foods**					**15**
TLTIKTEC25KV-1063	**Multipurpose Biomaterials**					**15**
TLTIKTEC25KV-1064	**Grain Technology**					**15**
TLTIKTEC25KV-1065	**Advanced Food Technology**					**15**
TLTIKTEC25KV-1066	**Consumer-Driven Product Development**					**15**
TLTIKTEC25KV-1042	**Urban Planning**					**0**
TLTIKTEC25KV-1043	**Development of Residential Environments**					**15**
TLTIKTEC25KV-1044	**Municipality as an Operating Environment**					**15**
AT00BY93	Municipality as an Operating Environment					0
AT00BY94	Development project of municipality					0
TLTIKTEC25KV-1027	**Elective Studies**					**0**
TLTIKTEC25KV-1073	**Automation**					**10**

AT00CY92	Basics of electricity and automation					0
TLTIKTEC25KV-1072	**Business and Production Economy**					**15**
AT00DA77	Business Operations in the Technology Industry					0
TLTIKTEC25KV-1011	**From data to machine learning**					**15**
AT00BY42	Data analysis and visualization					0
AT00BY43	Machine Learning					0
TLTIKTEC25KV-1074	**Basics of construction**					**30**
AT00CB13	Construction materials					0
AT00CB14	Concrete technics I					0
AT00CB15	Basics of Building Engineering					0
AT00CB16	Basics of Civil Engineering					0
AT00CB17	Basics of Surveying Technique					0
AT00CB18	Geotechnics					0
AT00CB19	Earthwork Engineering and Rock Excavation					0
TLTIKTEC25KV-1076	**Civil engineering II**					**15**
AT00CD36	Hydrology and Hydraulic Engineering					0
AT00CZ28	Rock construction technique					0
AT00CD38	Network Engineering					0
AT00CZ19	Network design					0
TLTIKTEC25KV-1077	**Civil engineering III**					**15**
AT00CD40	Intersections and Transportation Systems					0
AT00CD41	Environmental Geotechnology					0
AT00CD42	Maintenance of Infrastructure					0
AT00CD43	Surveying Technology and Automative Machinery					0
KTE2190	Basics of Bridges Engineering					0

TLTIKTEC25KV-1057 CORE COMPETENCE: 135 ECTS

TLTIKTEC25KV-1054 Common studies: 15 ECTS

AY00BU56 Developing professional competence 1: 1 ECTS

Learning outcomes
The student is able to
- plan their own learning and cooperate in situations related to their own field of studies
- recognize their own competence and the needs to develop them further and to plan their careerpath observing them
- act as a group member
- operate in the learning environments of LAB University of Applied Sciences
- picture their own field of studies and its future skills- give feedback on tuition and services and thus participate in the development of education

AY00BU57 Developing professional competence 2: 1 ECTS

Learning outcomes
The student is able to
- utilize various learning opportunities in curriculum
- recognize and aim their own competences to be in level with the future career requirements
- create a study plan that supports the future career goal
- give feedback on tuition and services and thus participate in the development of education

AY00BU58 Developing professional competence 3: 1 ECTS

Learning outcomes
The student is able to
- identify themselves as a learner and develop their own learning skills
- evaluate innovative or alternative future competences required in their own field
- recognize and aim their own competences to be in level with the future career requirements
- masters the professional concepts of their own field and is able to point out their competenciesduring job recruitment processes
- give feedback on tuition and services and thus participate in the development of education

A300CE13 Orientation to Sustainability Thinking: 2 ECTS

Learning outcomes
Identify and define central concepts and frameworks related to sustainability. Recognize the interconnectedness of economic, social and environmental sustainability issues. Understand and develop own individual role in driving sustainability.

Evaluation criterias
Level 1

Pass-Fail

KE00BT61 English for Work: 4 ECTS

Learning outcomes
Proficiency level: B2

The student is able to
- communicate clearly and effectively in different generic and field-specific workplace situations both orally and in writing
- find, evaluate and use information effectively
- function collaboratively in international working environments.

KR00BU42 Swedish for Work, Spoken: 1 ECTS

Learning outcomes
The student is able to
- convey and validate arguments
- use vital field-specific vocabulary
- communicate essential matters about their education, work experience and tasks
- present their field-specific operational environment
- communicate in various working life situations in Swedish.

The student completes the Public Administration Language Test in Swedish.

KR00BU43 Swedish for Work, Written: 1 ECTS

Learning outcomes
The student is able to
- use vital field-specific vocabulary
- communicate essential matters about their education, work experience and tasks
- understand and produce various short texts related to studies and working life
- acquire information on their field in Swedish
-use online dictionaries.

The student completes the Public Administration Language Test in Swedish.

KS00BT59 Expert Communication Skills: 4 ECTS

Learning outcomes
Proficiency level: C2

The student masters Finnish language as a mother tongue in all professional spoken and written communication situations.

TLTIKTEC25KV-1002 Professional Core Competence: 75 ECTS

TLTIKTEC25KV-1004 Basics of environmental engineering: 15 ECTS

AT00CP39 Ecosystems and Climate Change: 5 ECTS

Learning outcomes
The student is able to:
- explain the main principles of ecosystems and nutrient cycles
- identify human impacts on ecosystems, especially the reasons for and results of climate change
- identify ecosystem services and to reflect on their effects in society
carry out teamwork, applying reporting and information acquisition skills

AT00DC89 Water and energy management: 5 ECTS

Learning outcomes
The student

AT00CP42 Chemistry in Environmental Engineering: 5 ECTS

Learning outcomes
The student is able to:
- name inorganic and organic compounds
- connect the importance of functional groups to the properties and behaviour of environmental pollutants in different environmental matrices

- calculate heats of reaction and understand the basics of thermochemistry
- understand the basics of combustion and use combustion reactions to make flue gas calculations
- use the electrochemical series of metals and understand the basics related to oxidation-reduction reactions and corrosion in practice
- carry out basic calculations related to acids and bases and understand in practice the basics related to pH measurement, acid-base titration and neutralisation

TLTIKTEC25KV-1058 Basic Studies in Mathematics and Physics: 15 ECTS

AT00BT67 Basic studies in mathematics: 3 ECTS

Learning outcomes
Student is able to
- calculate and simulate mathematical expressions
- solve geometric and trigonometric problems
- knows bacis of vectors in plane

AT00BT68 Mathematics in Technology 1: 3 ECTS

Learning outcomes
Student is able to:
- recognise different polynomial equations, functions, and polynomial graphics
- solve inequalities
- solve simultaneous equations with the software
- solve basic space vectors
- utilise space vectors
- solve exponential and logarithm functions

AT00BT69 Mathematics in Technology 2: 3 ECTS

Learning outcomes
Student is able to:
- derivate functions and utilise derivation in practice
- integrate polynomial functions and utilise integration in practice
- solve other equations and trigonometrical problems

AT00BT70 Basic studies in physics: 3 ECTS

Learning outcomes
Student is able to
- understand the purpose of the physics in technology
- describe and utilize the SI-unit system and implement
- solve mathematical problems in kinematics, mechanics and thermodynamics
- utilize vectors

AT00BY87 Physics of enviromental engineering: 3 ECTS

Learning outcomes

The student can
- describe electrical phenomena behind technological development
- mathematically solve problems related to electricity and the decibel scale
- apply digital solutions to electricity-related phenomena
- describe noise control problems from the perspective of wave motion theory

TLTIKTEC25KV-1006 Material Cycles: 15 ECTS

AT00CP41 Contaminated Soil and waste Management: 5 ECTS

Learning outcomes
The student knows:
- the main methods of management and regulation in the field
- how to emphasise the impact of circular economy as part of sustainable waste management solutions
- how to identify key emission sources that cause soil and groundwater contamination
- the main principles of assessing the need for soil rehabilitation and the main rehabilitation methods

AT00CP45 Technical and biological material cycles: 5 ECTS

Learning outcomes
The Student:
- understands the importance of the sustainable consumption and use of technical and biological materials
- learns ways in which the consumption of particularly natural, non-renewable materials can be reduced
- gets basic information about planning and business models according to circular economy principles, which take into account the importance of material choices during the entire life cycle of products, processes and services
- identifies the value chains of selected industries, in terms of the material cycles involved

AT00CP46 Material efficiency in business: 5 ECTS

Learning outcomes
The student is able to:
- explain the common industrial material recycling processes and the technical solutions involved
- determine the key actors and current development areas in recycling
- understand basic solutions and practices for developing material efficiency
- carry out a material audit
- prepare an enterprise's material flow analysis
- explain the importance and practices of industrial symbiosis and material recycling as part of circular economy
- promote industrial symbioses between companies

TLTIKTEC25KV-1007 Circular Economy Guiding Methods: 15 ECTS

AT00CP49 Circular economy business models and product design: 5 ECTS

Learning outcomes

The student is able to:
- explain circular economy business models
- describe the main principles of cost accounting
- understand the product development process according to circular economy and the impact of value chains on it

AT00DB60 Environmental Legislation and Administration: 5 ECTS

Learning outcomes
The student is able to:
- find up-to-date information related to environmental legislation from free and paid information services
- outline the responsibilities of environmental legislation and various environmental management level tasks
- apply key laws and regulations of the environmental legislation through practical examples

AT00CP44 Environmental Impact Management: 5 ECTS

Learning outcomes
The student is able to:
- identify the main environmental impacts of different industries
- explain the basic techniques for minimising the harmful environmental impacts of enterprises
- explain the regulations and objectives related to environmental impact assessment
- analyse environmental data using statistical methods
- describe how project-level environmental impact assessment progresses and understand the assessment methods in general use
- describe the participatory procedures related to processes and the factors influencing their success
- study existing environmental impact assessment cases and report on them

TLTIKTEC25KV-1008 Digital tools for Circular Economy: 15 ECTS

AT00CP51 Computer Aided design and modelling: 5 ECTS

Learning outcomes
The student is able to:
- identify the potential of computer-aided design
- understand the basics of cad drawing and prepare simple drawings with the aid of the programme's basic functions
- explain the main principles of 3D- and data modelling of the built environment
- identify possible application of different modelling methods in the environmental field

AT00CP52 GIS and digital applications: 5 ECTS

Learning outcomes
The student is able to:
- identify the impacts and opportunities of digitalisation and industry 4.0 in the environmental sector
- understand the main principles of machine learning and programming
- explain applications of spatial data and use the QGIS spatial data programme (or a similar one)
- utilise various environmental databases

- recognise the risks of digitalisation and understand the significance of cyber security

AT00CP53 Life Cycle Analyses: 5 ECTS

Learning outcomes
The student is able to:
- describe the stages of the life cycle of products, as well as the environmental factors related to them
- understand commonly used life cycle methods and their uses
- carry out a life cycle analysis for the selected product

TLTIKTEC25KV-1021 Practical Training: 30 ECTS

HA00CD55 Practical Training: 10 ECTS

Learning outcomes
The student is able to
- describe work-related phenomena and use related concepts
- act in a productive way, following the practices of the workplace and the ethical principles of the profession
- use the techniques, work methods, models and processes that they have learnt
- act in a customer-oriented way in interactive situations in the workplace and in the cooperation network
- evaluate and develop their own competence int the work done in practical training

HA00BU60 Practical Training 2: 10 ECTS

Learning outcomes
The student is able to
- describe work-related phenomena and use related concepts
- act in a productive way, following the practices of the workplace and the ethical principles of the profession
- use the techniques, work methods, models and processes that they have learnt
- act in a customer-oriented way in interactive situations in the workplace and in the cooperation network
- evaluate and develop their own competence int the work done in practical training

HA00BU61 Practical Training 3: 10 ECTS

Learning outcomes
The student is able to
- describe work-related phenomena and use related concepts
- act in a productive way, following the practices of the workplace and the ethical principles of the profession
- use the techniques, work methods, models and processes that they have learnt
- act in a customer-oriented way in interactive situations in the workplace and in the cooperation network
- evaluate and develop their own competence int the work done in practical training

TLTIKTEC25KV-1022 Thesis: 15 ECTS

AO00BU62 Thesis Planning: 5 ECTS

Learning outcomes
The student is able to:
- describe the objectives and core contents of their thesis
- plan and describe the stages of the thesis process
- take into account the possible research permit and copyright issues

AO00BU63 Thesis Project: 5 ECTS

Learning outcomes
The student is able to:
- implement the thesis on the basis of an approved thesis plan.

AO00BU64 Thesis Report: 5 ECTS

Learning outcomes
The student is able to:
- present the results or output of their thesis
- report on their thesis in writing in accordance with the thesis guidelines of LAB University of Applied Sciences
- write a maturity test.

TLTIKTEC25KV-1009 COMPLEMENTARY COMPETENCE: 105 ECTS

TLTIKTEC25KV-1010 Circular Economy Applied Studies and Projects: 15 ECTS

AT00CZ00 Applied environmental projects 1: 5 ECTS

Learning outcomes
The student is able to:
- use the concepts related to the project in a coherent and justify their actions on the basis of the knowledge base
- find starting points, needs and criteria for project activities
- to act purposefully, to assess the activity and make suggestions for improvement
- applied to the project a variety of different techniques, methods and ways of working
- operate safely, ethically and customer-oriented
- to act responsibly and in a target group and as otherwise required by the project in interactive situations

AT00CZ01 Applied environmental projects 2: 5 ECTS

Learning outcomes
The student is able to:
- use the concepts related to the project in a coherent and justify their actions on the basis of the knowledge base
- find starting points, needs and criteria for project activities
- to act purposefully, to assess the activity and make suggestions for improvement
- applied to the project a variety of different techniques, methods and ways of working

- operate safely, ethically and customer-oriented
- to act responsibly and in a target group and as otherwise required by the project in interactive situations

AT00CZ02 Applied environmental projects 3: 5 ECTS

Learning outcomes
The student is able to:
- use the concepts related to the project in a coherent and justify their actions on the basis of the knowledge base
- find starting points, needs and criteria for project activities
- to act purposefully, to assess the activity and make suggestions for improvement
- applied to the project a variety of different techniques, methods and ways of working
- operate safely, ethically and customer-oriented
- to act responsibly and in a target group and as otherwise required by the project in interactive situations

TLTIKTEC25KV-1023 Sustainable Solutions Engineering: 0 ECTS

TLTIKTEC25KV-1048 Sustainable Energy Management: 15 ECTS

TLTIKTEC25KV-1049 Environmental, Quality and Project Management: 15 ECTS

TLTIKTEC25KV-1050 Circular Economy Co-Creation Hubs: 15 ECTS

TLTIKTEC25KV-1051 Digital Tools for Circular Economy: 15 ECTS

TLTIKTEC25KV-1052 Sustainable Industrial Management: 15 ECTS

TLTIKTEC25KV-1053 Sustainable Sludege and Water Management: 15 ECTS

TLTIKTEC25KV-1028 Wood Technology: 0 ECTS

TLTIKTEC25KV-1029 Basic Studies in Wood Engineering: 15 ECTS

TLTIKTEC25KV-1034 Basics of Wood and Biotechnology: 15 ECTS

TLTIKTEC25KV-1030 Sawmill Industry: 15 ECTS

TLTIKTEC25KV-1031 Panel Products and Engineered Wood Products: 15 ECTS

TLTIKTEC25KV-1033 Furniture Industry: 15 ECTS

TLTIKTEC25KV-1035 Biomaterials and Food Technology: 0 ECTS

TLTIKTEC25KV-1061 Basics of Biomaterials and Food Materials: 15 ECTS

TLTIKTEC25KV-1062 High-quality Foods: 15 ECTS

TLTIKTEC25KV-1063 Multipurpose Biomaterials: 15 ECTS

TLTIKTEC25KV-1064 Grain Technology: 15 ECTS

TLTIKTEC25KV-1065 Advanced Food Technology: 15 ECTS

TLTIKTEC25KV-1066 Consumer-Driven Product Development: 15 ECTS

TLTIKTEC25KV-1042 Urban Planning: 0 ECTS

TLTIKTEC25KV-1043 Development of Residential Environments: 15 ECTS

TLTIKTEC25KV-1044 Municipality as an Operating Environment: 15 ECTS

AT00BY93 Municipality as an Operating Environment: 5 ECTS

Learning outcomes
The student can
- acquire information on the regional administration reform and understands its impact on the municipalities
- understand the principles of a municipality as an operating environment and the appropriate decision-making principles
- understand starting points for general level planning and knows how to prepare and structure information on and
for master plans
- create development plans based on municipal needs

AT00BY94 Development project of municipality: 10 ECTS

Learning outcomes
The student can
- apply planning software to illustrate structured or created information
- acquire knowledge and create a report for the basis of a development project and make use of geographical data
- observe the site considering the environmental aspects
- prepare development suggestions in a project based on reviews and acquired data

TLTIKTEC25KV-1027 Elective Studies: 0 ECTS

TLTIKTEC25KV-1073 Automation: 10 ECTS

AT00CY92 Basics of electricity and automation: 10 ECTS

Learning outcomes
The student is able to:
- the basics of electricity and automation technology
- how to choose components used in machine automation
- the basics of electrical switchboard manufacturing
- how to program automation devices

TLTIKTEC25KV-1072 Business and Production Economy: 15 ECTS

AT00DA77 Business Operations in the Technology Industry: 15 ECTS

Learning outcomes
The course is mainly intended for engineering students. The aim of the course is for the student to be able to
- the basics of cash flow in industrial companies
- examine the products and operations of industrial companies from a customer-oriented perspective
- evaluate different management methods and their impact on corporate culture
- evaluate and develop industrial companies' internal logistics and aspects related to the supply chain
- evaluate the significance of the development of different areas in order to achieve the goals of industrial companies.

TLTIKTEC25KV-1011 From data to machine learning: 15 ECTS

AT00BY42 Data analysis and visualization: 10 ECTS

Learning outcomes
The student is able to
- utilize mathematical methods to analyze and to predict phenomena
- utilize a modern statistical tool
- visualize data to identify its properties, analysis interpretation and to facilitate further processing

AT00BY43 Machine Learning: 5 ECTS

Learning outcomes
The student is able to
- take advantage of both supervised and unsupervised machine learning in an appropriate way
- implement the fitting of the machine learning model
- take advantage of the supply of cloud services
- take into account the ethical guidelines of the authorities and the technology industry
- make use of existing machine learning ecosystems and equipment

TLTIKTEC25KV-1074 Basics of construction: 30 ECTS

AT00CB13 Construction materials: 5 ECTS

Learning outcomes
The student identifies the basic materials, basic characteristics and uses of building construction and infrastructure construction.
The student understands the effects of the properties and uses of building materials in construction and is able to utilise what they have learned in new situations. The student understands the basic concepts of chemistry related to building materials and the chemical phenomena that describe them. The student acquaints themselves with the usefulness of construction waste materials from the point of view of chemistry. The student recognises the principles of sustainable development.

AT00CB14 Concrete technics I: 4 ECTS

Learning outcomes
The student is able to design the composition of conventional concrete so that it meets the requirements for fresh and hardened concrete. Can produce conventional concrete according to plans. Can test the quality properties of concrete and evaluate the suitability of concrete mass. Understand the effect of different factors on the properties of concrete mass and hardened concrete. Understands the principles of concrete mass adjustment.

AT00CB15 Basics of Building Engineering: 5 ECTS

Learning outcomes
The student understands the whole of the parts of a building and their main functions. The student is familiar with the options for the outer shell, surfaces and non-load-bearing structures as well as the complementary building components. The student understands the most important concepts of fire safety in buildings and the principles of moisture insulation. The student is familiar with the most common markings and permit practices in the construction industry. The student knows the basics of computer-aided designing.

AT00CB16 Basics of Civil Engineering: 5 ECTS

Learning outcomes
The student knows the different elements of the built environment, the related research and how they relate to each other. The student knows the different stages of zoning and understands the importance of zoning as the basis for all construction. The student is familiar with environmental problems and related legislation. The student is able to take into account the principles of sustainable development in the design and implementation of the built environment. The student gets acquainted with BIM + CAD-based design software.

AT00CB17 Basics of Surveying Technique: 3 ECTS

Learning outcomes
The student knows the basics of geometric measurements in construction and the processes of building measurements, and is familiar with the most common measuring instruments. The student masters the practice of mapping and marking measurement. The student is able to process measurement data.

AT00CB18 Geotechnics: 3 ECTS

Learning outcomes
The student knows the typical geological soil layers and how they are created. The student can name the soil types according to both the geotechnical soil classification and the Eurocodes.
The student knows the concepts and phenomena as well as copes with simple calculations related to soil types,structural properties, hydraulic properties, groundwater and other moisture, frost and frosting.
The student knows the most common soil and laboratory studies and identifies the initial data needed in geotechnical design.

AT00CB19 Earthwork Engineering and Rock Excavation: 5 ECTS

Learning outcomes
The student knows the machines and methods used in construction work as well as the requirements for construction structures. The student is able to plan machine combinations for different work sites.
The student understands and is able to plan the implementation of opencast mining and knows the legislation and safety instructions related to mining.

TLTIKTEC25KV-1076 Civil engineering II: 15 ECTS

AT00CD36 Hydrology and Hydraulic Engineering: 3 ECTS

Learning outcomes
The student understands the quantities of hydrology and masters their measurement methods, is able to interpret observational data and acquire the initial data required for construction projects. The student understands the principles of hydrostatics and the dimensioning and calculation of losses in pipes and open streams, is able to perform simple dimensioning tasks and understands how discharge is conducted from openings and overflow dams.

AT00CZ28 Rock construction technique: 5 ECTS

Learning outcomes
The student
- knows properties of bedrock and understands how they affect execution of a rock construction project.
- recognizes the principles of rock construction design and dimensioning as well as different methods for rock excavation, rock support and rock grouting, and can apply the knowledge in a sustainable way.

AT00CD38 Network Engineering: 3 ECTS

Learning outcomes
The student knows the methods of new construction and renovation of the water supply network and the materials used for them. The student is able to take into account the occupational safety aspects of building a water supply network.

AT00CZ19 Network design: 4 ECTS

Learning outcomes
The student is able to design a simple water supply network and choose suitable devices and equipment

for it, and is able to place structures in a design environment.

TLTIKTEC25KV-1077 Civil engineering III: 15 ECTS

AT00CD40 Intersections and Transportation Systems: 3 ECTS

Learning outcomes
The student understands the connection between traffic and land use, the basics of traffic studies and the variations in traffic. He knows the factors that affect traffic safety as well as the basics of traffic management. The student is familiar with the intersection types and is able to design an at-grade intersection.

AT00CD41 Environmental Geotechnology: 3 ECTS

Learning outcomes
The student develops geotechnical thinking and problem solving skills; adopts information retrieval methods and presentation skills in the field; knows the importance of the soil in zoning; adopts the basics of environmental geotechnical design and construction.

AT00CD42 Maintenance of Infrastructure: 3 ECTS

Learning outcomes
The student is familiar with the life cycle thinking of traffic routes and is able to apply it to traffic route maintenance. The student knows the mechanisms of damage to superstructures and the main principles of care and renovation.

AT00CD43 Surveying Technology and Automative Machinery: 3 ECTS

Learning outcomes
The student knows the main regulations and instructions for infrastructure measurement as well as typical site measurements. The student knows the basics of machine control modelling and laser scanning.

KTE2190 Basics of Bridges Engineering: 3 ECTS

Learning outcomes
.The student knows the different types of bridges and their applications: they can use tables to dimension bridge loads, are able to draft a general drawing of a bridge, they identify bridge construction methods and and are able to formwork, construct scaffolding and conduct reinforcement work, they know the quality requirements of bridges and master maintenance and repair work.